

## WE CLAIM:

1. A solid composite polymer electrolyte comprising:

a general amorphous branched polymer having recurrent units, each of which includes a backbone chain and at least a side chain linked to said backbone chain and containing at least one coordination potential atom;

an amphoteric metal salt dispersed in said branched polymer and forming Lewis acid-base interactions with said side chains; and

an amphoteric Lewis acid-base ceramic filler dispersed in said branched polymer and forming Lewis acid-base interactions with said side chains and said metal salt.

2. The solid composite polymer electrolyte of Claim 1, wherein said backbone chain of said branched polymer is selected from a group consisting of a  $-P=N-$  group and a  $-C-C-$  group, and said coordination potential atom of said side chain is selected from a group consisting of an alkoxy group and a  $C\equiv N$  group.

3. The solid composite polymer electrolyte of Claim 2, wherein said backbone chain of said branched polymer is a  $-P=N-$  group, and said coordination potential atom of said side chain is an alkoxy group.

4. The solid composite polymer electrolyte of Claim 3, wherein said branched polymer is poly[bis(methoxyethoxyethoxy)phosphazene] having a molecular weight

ranging from about 1000 to about  $10^6$ .

5. The solid composite polymer electrolyte of Claim 2, wherein said backbone chain of said branched polymer is a -C-C- group, and said coordination potential atom of said side chain is a  $C\equiv N$  group.

6. The solid composite polymer electrolyte of Claim 5, wherein said branched polymer is polyacrylonitrile having a molecular weight ranging from about 10000 to about  $10^7$ .

7. The solid composite polymer electrolyte of Claim 2, wherein said ceramic filler is made from a material selected from a group consisting of  $\alpha$ - $Al_2O_3$  and  $TiO_2$ .

8. The solid composite polymer electrolyte of Claim 7, wherein said metal salt is a lithium salt.

9. The solid composite polymer electrolyte of Claim 8, wherein said lithium salt is lithium perchlorate.

10. The solid composite polymer electrolyte of Claim 9, wherein said branched polymer is poly[bis(methoxy ethoxyethoxy)phosphazene], and said ceramic filler is made from  $\alpha$ - $Al_2O_3$ , said solid composite polymer electrolyte comprising 86 to 95% by weight of poly[bis(methoxy ethoxyethoxy)phosphazene], 4 to 9% by weight of lithium perchlorate, and 1 to 5% by weight of  $\alpha$ - $Al_2O_3$ .

11. The solid composite polymer electrolyte of Claim 10, comprising 90 to 92.5% by weight of poly[bis(methoxy ethoxyethoxy)phosphazene], 5.5 to

7% by weight of lithium perchlorate, and 2 to 3% by weight of  $\alpha$ -Al<sub>2</sub>O<sub>3</sub>.

12. The solid composite polymer electrolyte of Claim 9, wherein said branched polymer is polyacrylonitrile, said solid composite polymer electrolyte comprising 41 to 70% by weight of polyacrylonitrile, 27 to 50% by weight of lithium perchlorate, and 3 to 9% by weight of said ceramic filler.

13. The solid composite polymer electrolyte of Claim 12, comprising 47 to 60% by weight of polyacrylonitrile, 35 to 45% by weight of lithium perchlorate, and 5 to 8% by weight of said ceramic filler.

14. The solid composite polymer electrolyte of Claim 7, wherein said ceramic filler has a particle size less than 150 microns.